(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 418 581 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.12.2018 Bulletin 2018/52

(51) Int Cl.:
F04D 29/66 *(2006.01)* ***F25D 17/06*** *(2006.01)*

(21) Application number: **18176205.5**

(22) Date of filing: **06.06.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **20.06.2017 CN 201720716475 U**

(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
- **Bao, Hongfu**
  Chuzhou, 239016 (CN)
- **Chen, Jia**
  Lian Yun Gang, 222200 (CN)
- **Chen, Xiupeng**
  CN 210046 Nanjing (CN)
- **Wang, Huake**
  CN 210046 Nanjing, Jiangsu (CN)
- **Wang, Shiyu**
  Nanjing, 210000 (CN)

(54) **REFRIGERATOR AND FAN ASSEMBLY THEREOF**

(57) The present utility model provides a fan assembly, including a mounting base, where the mounting base includes a housing accommodating a fan, and a reinforcement member that fastens the housing to a to-be-mounted structure; the housing is provided with a first connecting member and the reinforcement member is provided with a second connecting member that matches and that is connected to the first connecting member; and the first connecting member is indirectly connected to the second connecting member by using a vibration reduction element. The present utility model further provides a refrigerator having the foregoing fan assembly. Therefore, the housing of the fan and a body of the refrigerator are not directly rigidly connected any longer, thereby greatly reducing noise generated by high-speed operation of the fan.

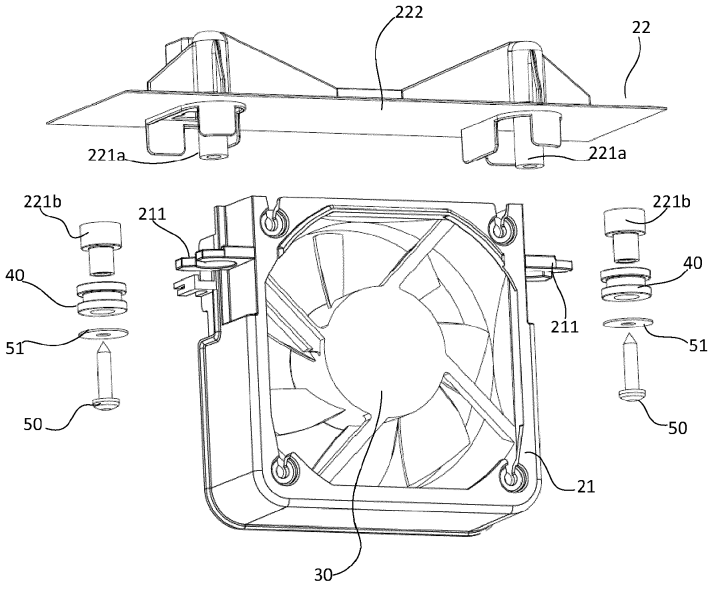

FIG. 4

EP 3 418 581 A1

Description

BACKGROUND

Technical Field

[0001] The present invention relates to the field of refrigeration devices, and in particular, to a refrigerator and a fan assembly of the refrigerator.

Related Art

[0002] As most common appliance products in homes, refrigerators undertake daily works of retaining food freshness for users.

[0003] To resolve a problem of nonuniform cooling of a static cooling refrigerator, a fan is additionally disposed in a storage room of an existing refrigerator, cold air circulation within the storage room is strengthened by using the fan, thereby implementing a more uniform temperature of the storage room. High-speed operation of the fan easily generates noise. How to better resolve the noise problem is always concerned by a person skilled in the art.

SUMMARY

[0004] A first aspect of the present utility model provides an improved fan assembly, to resolve at least one of the foregoing technical problems such as a problem of noise generated by vibration of a fan. The fan assembly includes a mounting base, where the mounting base includes a housing accommodating a fan, and a reinforcement member that fastens the housing to a to-be-mounted structure; the housing is provided with a first connecting member and the reinforcement member is provided with a second connecting member that matches and that is connected to the first connecting member; and the first connecting member is indirectly connected to the second connecting member by using a vibration reduction element.

[0005] Compared with the prior art, the technical solutions of the present utility model have the following advantages:

The housing of the fan and a body of a refrigerator are indirectly flexibly connected by using the vibration reduction element without being directly rigidly connected any longer. Therefore, vibration energy of the housing of the fan is absorbed by the vibration reduction element without being directly transferred to the body of the refrigerator, thereby greatly reducing noise generated by high-speed operation of the fan.

[0006] Optionally, the vibration reduction element is sleeved on the second connecting member, and the first connecting member is engaged with the vibration reduction element.

[0007] Optionally, at least a part of the second connecting member passes though the vibration reduction element and exceeds a preset length of an end portion that is of the vibration reduction element and that is far away from the reinforcement member.

[0008] Optionally, the second connecting member includes a fastener and a gasket connected to the fastener, the vibration reduction element is sleeved on the gasket, and at least a part of the gasket passes through the vibration reduction element and exceeds the preset length of the end portion that is of the vibration reduction element and that is far away from the reinforcement member.

[0009] Optionally, the second connecting member includes a fastener, and at least a part of the fastener passes through the vibration reduction element and exceeds the preset length of the end portion that is of the vibration reduction element and that is far away from the reinforcement member.

[0010] Optionally, the reinforcement member further includes a body plate, and the fastener is located at one side that is of the body plate and that faces the housing.

[0011] Optionally, the fastener and a plate surface of the body plate are intersected, the fastener is provided with a through hole extending along a length direction, and the through hole runs through the body plate.

[0012] Optionally, the fan assembly further includes a screw, and the screw is driven into the through hole to implement a fixed connection.

[0013] Optionally, the screw has a limiting step, and after the screw is driven into the through hole, the limiting step abuts against a hole edge of the through hole, to implement a limitation.

[0014] Another aspect of the present utility model provides an improved refrigerator, to resolve at least one of the foregoing technical problems. The refrigerator includes a body having a storage room and the fan assembly according to any one of the foregoing implementations, and the fan assembly is located in the storage room and is fastened to the body by using the mounting base.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a schematic diagram of an inner structure of a refrigerator in a square view direction according to an embodiment of the present utility model;

FIG. 2 is a schematic diagram of an inner structure of a refrigerator in a right view direction according to an embodiment of the present utility model;

FIG. 3 is a schematic structural diagram of a fan assembly in a refrigerator according to a first embodiment of the present utility model;

FIG. 4 is a schematic exploded view of the fan assembly in FIG. 3;

FIG. 5 is a schematic exploded view of a fan assem-

bly according to a second embodiment of the present utility model; and

FIG. 6 is a schematic exploded view of a fan assembly according to a third embodiment of the present utility model.

DETAILED DESCRIPTION

[0016] To make the above objectives, features, and advantages of the present utility model clearer and more comprehensible, specific embodiments of the present utility model are described below in detail with reference to the accompanying drawings.

[0017] Referring to FIG. 1 and FIG. 2, the present utility model provides a refrigerator 1 and a fan assembly 10 disposed in the refrigerator 1. FIG. 2 is a diagram of an inner structure of the refrigerator 1 in FIG. 1 in a right view direction. The refrigerator 1 includes a body 3 having one or more storage rooms 2, and the fan assembly 10 is disposed in the storage room 2, and is generally disposed at one side that is of the storage room 2 and that is far away from a door of the refrigerator, that is, at an inner side of the storage room 2.

[0018] Referring to FIG. 3 and FIG. 4, the fan assembly 10 includes a mounting base 20 and a fan 30 that is fastened to the mounting base 20. The fan assembly 10 is fastened to the body 3 by using the mounting base 20. The mounting base 20 includes a housing 21 accommodating the fan 30, and a reinforcement member 22 that fastens the housing 21 to a to-be-mounted structure; the housing 21 is provided with a first connecting member 211 and the reinforcement member 22 is provided with a second connecting member 221 that matches and that is connected to the first connecting member 211; and the first connecting member 211 is indirectly connected to the second connecting member 221 by using a vibration reduction element 40.

[0019] An advantage of the solution is that the housing of the fan and the body of the refrigerator are indirectly flexibly connected by using the vibration reduction element without being directly rigidly connected any longer. Therefore, vibration energy of the housing of the fan is absorbed by the vibration reduction element without being directly transferred to the body of the refrigerator, thereby greatly reducing noise generated by high-speed operation of the fan.

[0020] In the fan assembly 10, a function of the fan 30 is accelerating air flowing in the storage room 2, so that temperature distribution within the storage room 2 is more uniform. Generally, an air exhaust vent of the fan 30 is close to an inner wall of the storage room 2, and an air intake vent faces a relatively large space, so that air in the storage room 2 flows towards the air intake vent, enters the fan 30 from the air intake vent, and flows out from the air exhaust vent after being mixed by the fan 30, thereby achieving a uniform air temperature. Therefore, it can be understood that when a user opens the door, one side of the air exhaust vent of the fan 30 is located at a relatively concealed location and is not easily seen.

[0021] It can be learned from the embodiment shown in FIG. 2 that, the fan assembly 10 is located at the inner side of the storage room 2, and an air intake vent 10a of the fan 30 is located at one side that is of the door and that faces the refrigerator 1, and an air exhaust vent 10b is located at one side that is of the door and that is away from the refrigerator 1. In this way, when a user opens the door, the user can see the air intake vent 10a of the fan 30, but cannot see the air exhaust vent 10b of the fan 30.

[0022] As shown in FIG. 3 and FIG. 4, the mounting base 20 includes the housing 21 accommodating the fan 30, and the reinforcement member 22 that fastens the housing 21 to the to-be-mounted structure. The reinforcement member 22 includes a body plate 222 and the second connecting member 221. In this embodiment, the second connecting member 221 includes a fastener 221a and a gasket 221b that may be connected together. In a process of mounting or dismounting the mounting base 20, the fastener 221a and the gasket 221b may be separated from each other.

[0023] The fastener 221a extends towards one side that is of the body plate 222 and that faces the housing 1. The fastener 221a and a plate surface of the body plate 222 are intersected. The plate surface of the body plate 222 has a first surface facing the housing 21, and a second surface away from the housing 21. The gasket 221 b has an end portion that is close to the body plate 222 and an end portion that is far away from the body plate 222. Particularly, the radial width of the end portion that is of the gasket 221b and that is close to the body plate 222 is greater than that of the end portion that is far away from the body plate 222. The end portion that is of the gasket 221b and that is close to the body plate 222 is connected to the fastener 221a. The end portion that is of the gasket 221b and that is far away from the body plate 222 passes through the vibration reduction element 40, that is, the vibration reduction element 40 is sleeved on the end portion that is of the gasket 221b and that is far away from the body plate 222. Preferably, the vibration reduction element 40 is made of a silica gel material and has a good vibration isolation effect. The first connecting member 211 of the housing 21 is engaged with the vibration reduction element 40. In this way, the first connecting member 211 is indirectly connected to the second connecting member 221 by using the vibration reduction element 40, so that the housing of the fan and the body of the refrigerator are indirectly flexibly connected by using the vibration reduction element without being directly rigidly connected any longer. Therefore, vibration energy of the housing of the fan is absorbed by the vibration reduction element without being directly transferred to the body of the refrigerator, thereby greatly reducing noise generated by high-speed operation of the fan.

[0024] Both the fastener 221a and the gasket 221b are provided with through holes that extend along a length direction and that are communicated with each other, and a screw 50 is driven into the through hole, to better implement a fixed connection between the housing 21 and the reinforcement member 22. Preferably, the end portion that is of the gasket 221b and that is far away from the body plate 222 exceeds a preset length, for example, 2-3 millimeters, of an end portion that is of the vibration reduction element 40 and that is far away from the body plate 222. In this way, after the screw 50 is driven into the gasket 221b, a head of the screw 50 may be prevented from pressing against the vibration reduction element 40, thereby ensuring that vibration isolation performance of the vibration reduction element 40 is not affected. Preferably, a gasket 51 is further disposed on the end portion that is of the vibration reduction element 40 and that is far away from the body plate 222, to further prevent the head of the screw 50 from excessively pressing against the vibration reduction element 40.

[0025] FIG. 5 is a schematic exploded view of a fan assembly according to a second embodiment of the present utility model. A difference between this embodiment and the first embodiment at least lies in that the second connecting member of the reinforcement member 22 is formed by extending the fastener 221a' through the vibration reduction element 40 to the side that is of the body plate 222 and that faces the housing 1. That is, in this embodiment, the second connecting member is basically formed by extending the fastener 221a', so that disposition of the gasket 221b is omitted. Preferably, the end portion that is of the fastener 221a' and that is far away from the body plate 222 exceeds the preset length, for example, 2-3 millimeters, of the end portion that is of the vibration reduction element 40 and that is far away from the body plate 222. In this way, after the screw 50 is driven into the fastener 221a', the head of the screw 50 may be prevented from excessively pressing against the vibration reduction element 40, thereby ensuring that vibration isolation performance of the vibration reduction element 40 is not affected.

[0026] FIG. 6 is a schematic exploded view of a fan assembly according to a third embodiment of the present utility model. A difference between this embodiment and the first embodiment at least lies in that the second connecting member of the reinforcement member 22 is basically directly formed by using the fastener 221a in FIG. 4, so that disposition of the gasket 221b is omitted. In addition, a screw 50' has a limiting step 52', and after the screw 50' directly passes through the vibration reduction element 40 and is driven into the through hole of the fastener 221a, the limiting step 52' of the screw 50' abuts against a hole edge 221c of the through hole of the fastener 221a, to implement a limitation, so that the screw 50' is prevented from further being driven into the through hole, and the head of the screw 50' may be prevented from excessively pressing against the vibration reduction element 40, thereby ensuring that vibration isolation performance of the vibration reduction element 40 is not affected.

[0027] Although the present utility model has been disclosed above, the present utility model is not limited thereto. Any person skilled in the art can make various modifications and changes without departing from the spirit and the scope of the present utility model. Therefore, the protection scope of the present utility model should be subject to the scope defined by the appended claims.

Claims

1. A fan assembly (10), comprising a mounting base (20), wherein the mounting base (20) comprises a housing (21) accommodating a fan (30), and a reinforcement member (22) that fastens the housing (21) to a to-be-mounted structure; and
   the housing (21) is provided with a first connecting member (211) and the reinforcement member (22) is provided with a second connecting member (221) that matches and that is connected to the first connecting member (211), **characterized in that**, the first connecting member (211) is indirectly connected to the second connecting member (221) by using a vibration reduction element (40).

2. The fan assembly according to claim 1, **characterized in that**, the vibration reduction element (40) is sleeved on the second connecting member (221), and the first connecting member (211) is engaged with the vibration reduction element (40).

3. The fan assembly according to claim 2, **characterized in that**, at least a part of the second connecting member (221) passes though the vibration reduction element (40) and exceeds a preset length of an end portion that is of the vibration reduction element (40) and that is far away from the reinforcement member (22).

4. The fan assembly according to claim 2 or 3, **characterized in that**, the second connecting member (221) comprises a fastener (221a) and a gasket (221b) connected to the fastener (221a), the vibration reduction element (40) is sleeved on the gasket (221b), and at least a part of the gasket (221b) passes through the vibration reduction element (40) and exceeds the preset length of the end portion that is of the vibration reduction element (40) and that is far away from the reinforcement member (22).

5. The fan assembly according to claim 2 or 3, **characterized in that**, the second connecting member comprises a fastener (221a'), and at least a part of the fastener (221a') passes through the vibration reduction element (40) and exceeds the preset length

of the end portion that is of the vibration reduction element (40) and that is far away from the reinforcement member (22).

6. The fan assembly according to any one of claims 1 to 3, **characterized in that**, the second connecting member comprises the fastener (221a\221a'), the reinforcement member (22) further comprises a body plate (222), and the fastener (221a\221a') is located at one side that is of the body plate (222) and that faces the housing (21).

7. The fan assembly according to claim 6, **characterized in that**, the fastener (221a\221a) and a plate surface of the body plate (222) are intersected, the fastener (221a\221a') is provided with a through hole extending along a length direction, and the through hole runs through the body plate (222).

8. The fan assembly according to claim 7, **characterized in that**, the fan assembly further comprises a screw (50), and the screw (50) is driven into the through hole to implement a fixed connection.

9. The fan assembly according to claim 8, **characterized in that**, the screw (50') has a limiting step (52'), and after the screw (50') is driven into the through hole, the limiting step (52') abuts against a hole edge (221c) of the through hole, to implement a limitation.

10. A refrigerator (1) comprising a body (3) having a storage room (2), **characterized in that**, the refrigerator (1) comprises a fan assembly (10) according to any one of claims 1 to 9, and the fan assembly (10) is located in the storage room (2) and is fastened to the body (3) by using a mounting base (11).

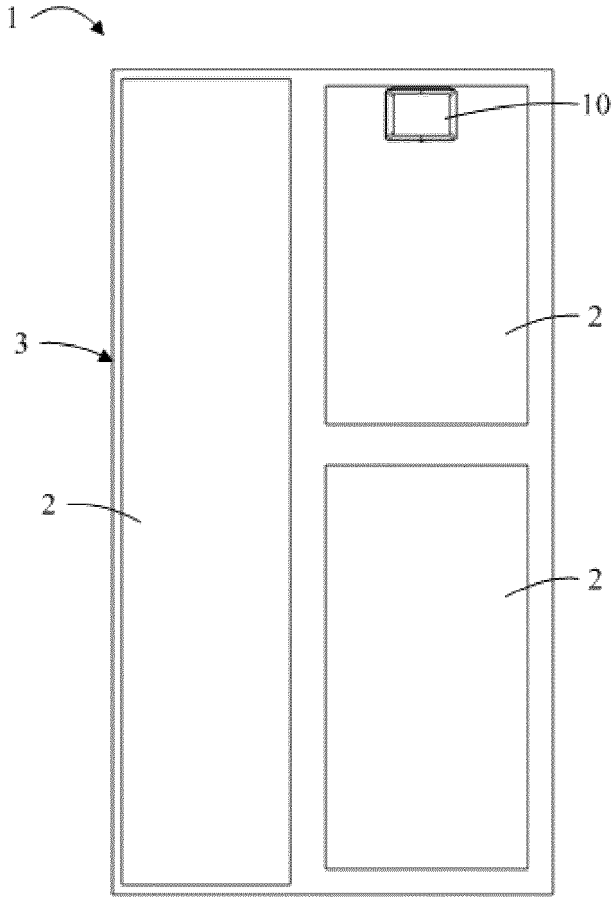

FIG. 1

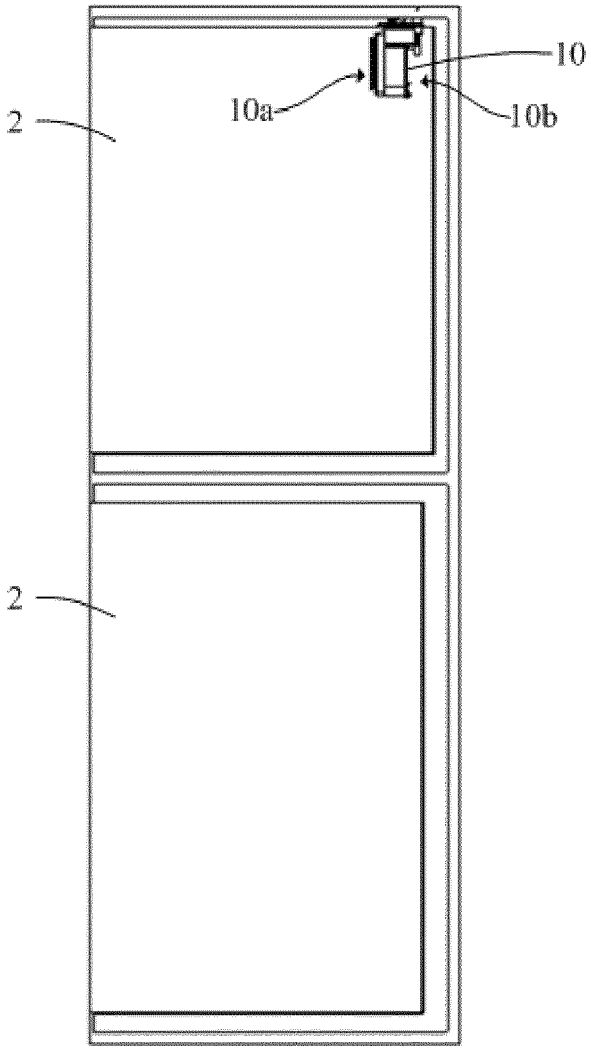

FIG. 2

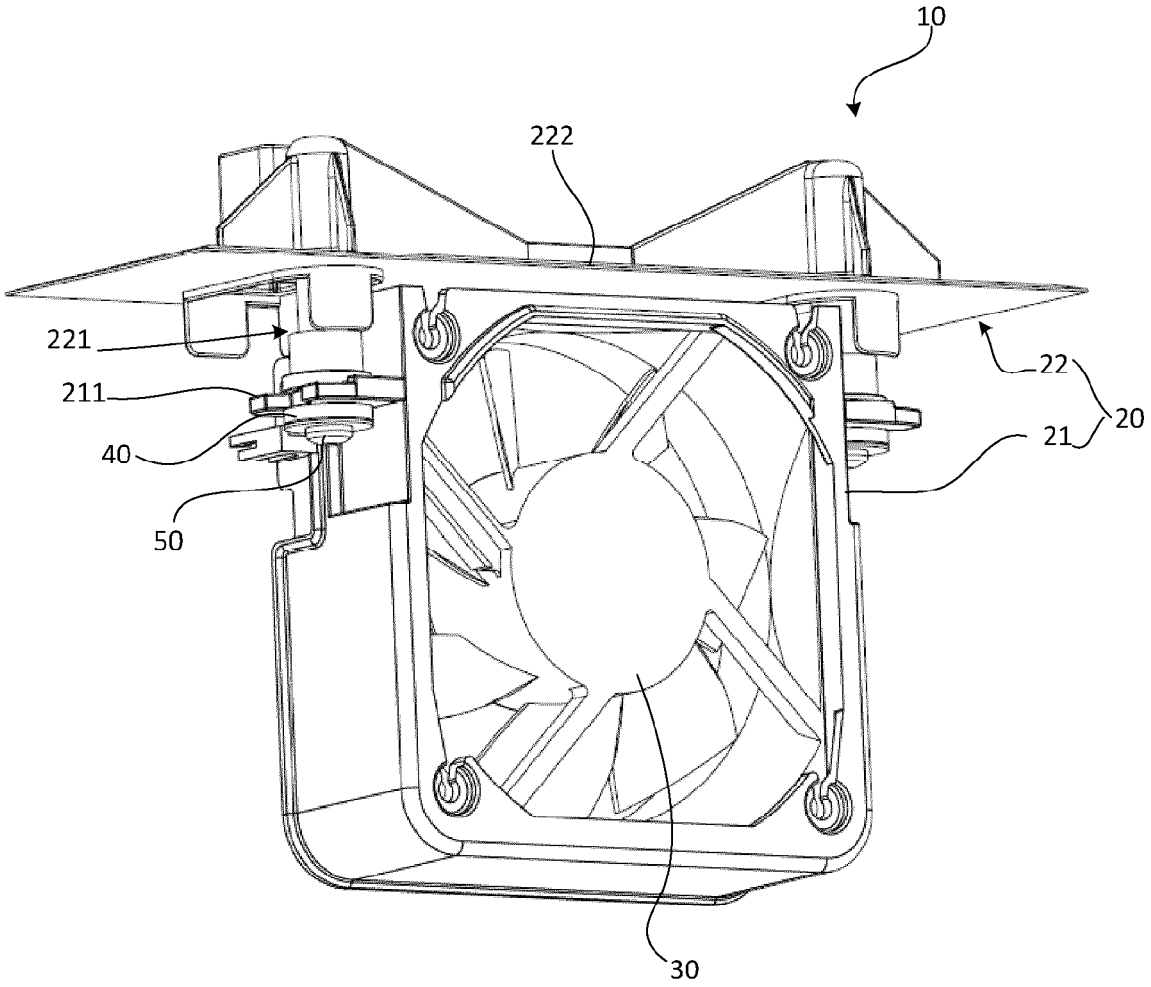

FIG. 3

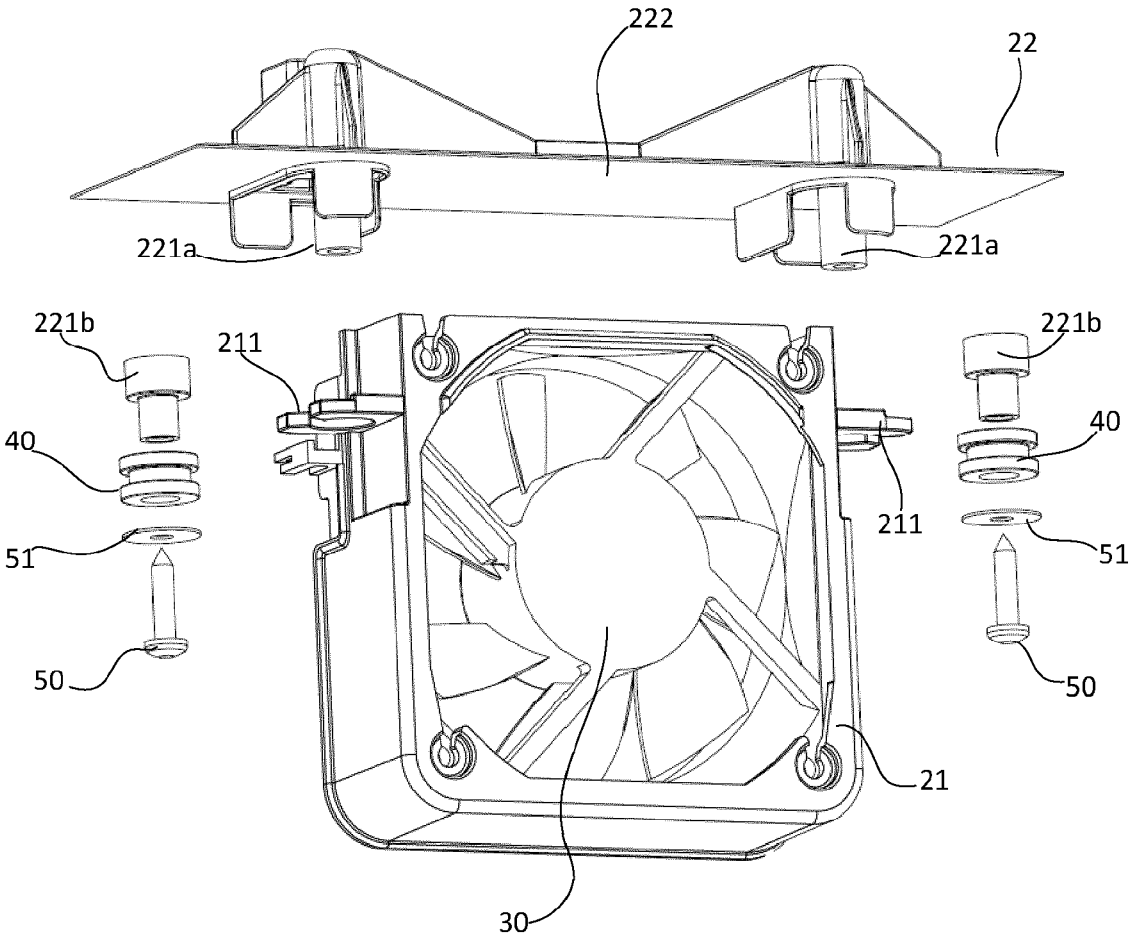

FIG. 4

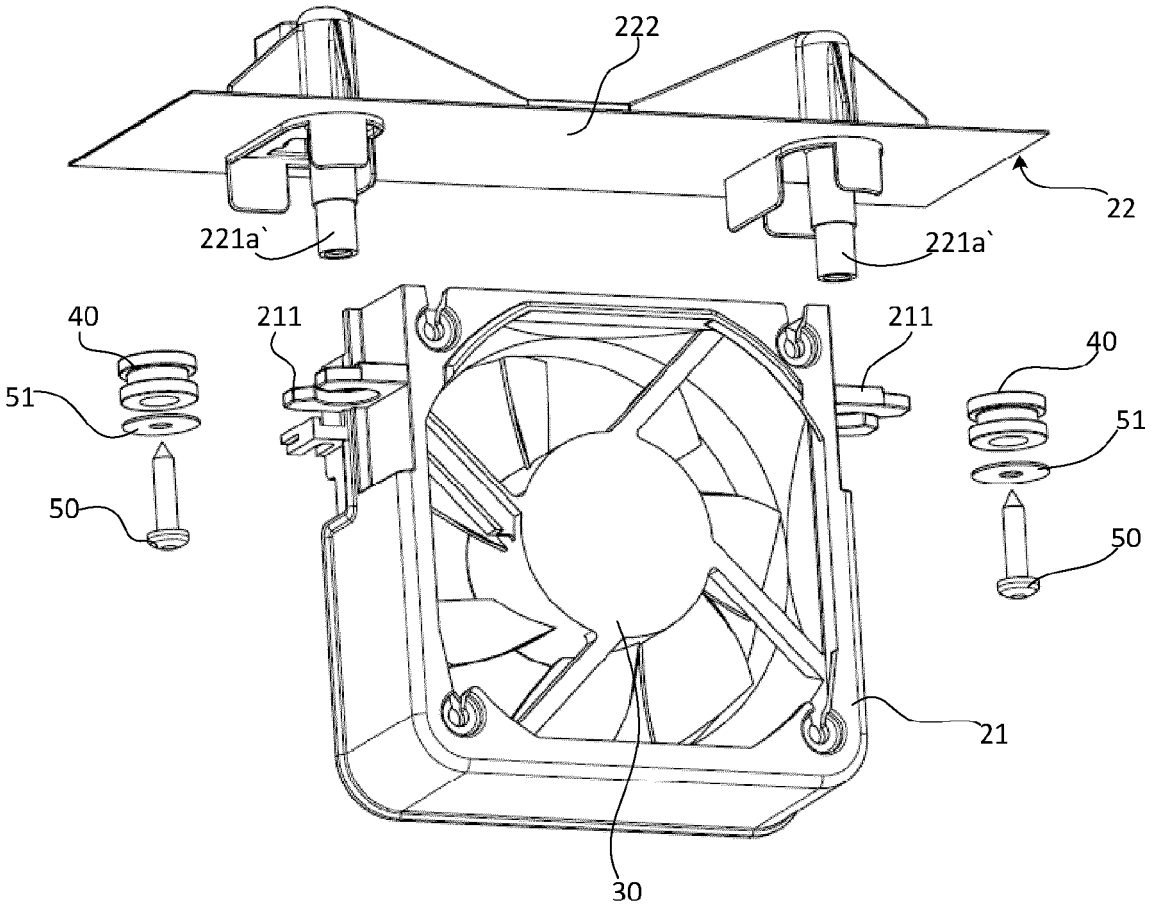

FIG. 5

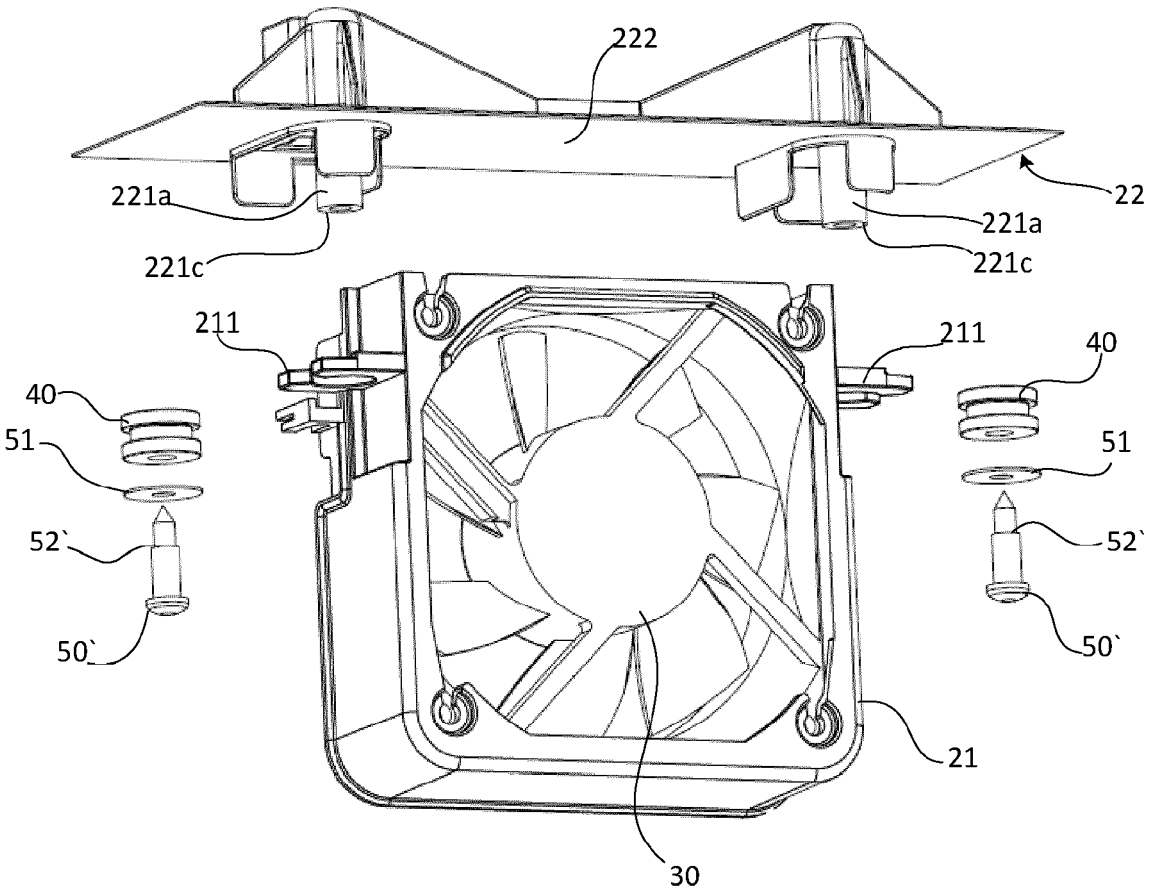

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 17 6205

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 20 2005 014370 U1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 20 July 2006 (2006-07-20) * paragraph [0022] - paragraph [0030]; figures 2-7 *	1-10	INV. F04D29/66 F25D17/06
X	WO 2014/101936 A1 (ARCELIK AS [TR]; VARDAR OSMAN [TR]; YAZGAN UMUD [TR]; KIRLI FAHRI [TR]) 3 July 2014 (2014-07-03) * figure 1 *	1-10	
X	WO 03/089858 A1 (MULTIBRAS ELETRODOMESTICOS SA [BR]; SCHMID ALEXANDRE CURY [BR]; CARGNI) 30 October 2003 (2003-10-30) * the whole document *	1,2,10	
X	DE 202 19 814 U1 (THOMA PETER [DE]) 6 March 2003 (2003-03-06) * the whole document *	1-8	
X	EP 3 079 035 A1 (COOLER MASTER CO LTD [TW]) 12 October 2016 (2016-10-12) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) F25B F04D F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 October 2018	de Graaf, Jan Douwe

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 17 6205

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-10-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202005014370 U1	20-07-2006	CN 101263351 A	10-09-2008
		DE 202005014370 U1	20-07-2006
		EP 1926947 A2	04-06-2008
		WO 2007031457 A2	22-03-2007
WO 2014101936 A1	03-07-2014	CN 105051472 A	11-11-2015
		EP 2936011 A1	28-10-2015
		PL 2936011 T3	31-05-2017
		US 2015322967 A1	12-11-2015
		WO 2014101936 A1	03-07-2014
WO 03089858 A1	30-10-2003	AR 038318 A1	12-01-2005
		AU 2003227144 A1	03-11-2003
		BR 0201397 A	06-01-2004
		DE 60318566 T2	08-01-2009
		EP 1497600 A1	19-01-2005
		MX PA04010270 A	03-02-2005
		US 2005173997 A1	11-08-2005
		WO 03089858 A1	30-10-2003
DE 20219814 U1	06-03-2003	AU 2003283270 A1	22-07-2004
		CN 1720398 A	11-01-2006
		DE 20219814 U1	06-03-2003
		EP 1581746 A1	05-10-2005
		US 2006165532 A1	27-07-2006
		WO 2004059172 A1	15-07-2004
EP 3079035 A1	12-10-2016	CN 106151106 A	23-11-2016
		EP 3079035 A1	12-10-2016
		US 2016298671 A1	13-10-2016

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82